I have been unable to watch them as closely, for they have not been caged, but have been at large, first in a room by themselves until February, and later associated in another room with a number of meadowlarks that had been reared in previous years. I particularly wish to refer to one of the birds, a male which has arrested the attention of all observers.

In the same room with these larks there are three blackbirds, *Merula merula* (Linnæus), which I procured from Germany. All of these birds are males, and they sing chiefly late in the afternoon, but much more frequently during the night, especially when there is moonlight. Early in February I heard constantly what I supposed was the song of one of these blackbirds. The curious part of it was that only one measure of the song was produced, a silvery whistling sequence of five or six notes rather longer drawn out, and given with much precision. For several weeks I ascribed this to one of the blackbirds, and believed that because of the shelter afforded them by many evergreen trees in my bird room that it could only be this bird, though I was unable to see the singer while hearing the song. My friend, Mr. Horsfall, who was with me during all the time, checked my observations, but we neither of us were able to *locate* the songster.

One of my meadowlarks of the brood mentioned attracted our attenion by his behavior and deportment during the early part of April. In addition to his song, which was quite dissimilar to that of a wild meadowlark, he accompanied the performance by what I should call a parade or dance, analogous to the strut of the turkey-cock. It is so marked a characteristic of this and other individuals of the same species that I determined to have it recorded in a color sketch, and for two or three days Mr. Horsfall and I spent much time in getting the position and manner of the bird while occupied in this kind of behavior. The bird sang frequently while going through the manœuvre described, and both of us finally saw and heard him many times sing, preparatory to or after his own song, the cadence described, which I had referred, before I saw the meadowlark do it, to the European blackbird.

While I am fully aware that under the artificial conditions of confinement birds are extremely likely to acquire abnormal songs, I can not but feel that the knowledge of the methods of song which has come to me while watching birds under these conditions, indicate a receptivity which to some extent undoubtedly obtains in their lives out of doors. My conclusion is that birds are influenced in their early lives very strongly by any noise that arrests their attention, even in a wild state, and that this propensity to imitate and differentiate their normal methods of song is greatly exaggerated under the artificial state wherein they live when in confinement.

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STANDARD TESTS OF AUDITION.*

IN a recent publication from this laboratory,† tests for acuteness of hearing were divided into two classes: speech-tests, which employ letters, words or sentences, spoken aloud or whispered, and mechanical tests, which employ such apparatus as the watch, the tuning fork and the acoumeter. The existence and the common use of these two methods, for similar purposes, seem to be explained by the fact that each method possesses peculiar advantages, while neither is sufficiently free from serious defects to give it the whole field. The method that employs the voice measures directly the most important function of audition, the hearing of human speech, and it may, at the same time, be made sufficiently complex to cover a wide range of tone and noise; but, to offset this advantage, the method suffers from the great variability of the vocal stimulus. Mechanical tests, on the other hand, are simpler and are more easily standardized; but they do not—just because of their simplicity—furnish an adequate and reliable expression of general

* From the Psychological Laboratory of Cornell University.

† See 'Auditory Tests,' B. R. Andrews, *Amer. Journal of Psych.*, XV., 14.

auditory capacity. An individual who hears with difficulty ordinary conversation may, nevertheless, pass a fair examination with the watch tick or the tuning fork.

There is no doubt that human speech, could it be definitely controlled, would furnish the most adequate and the most comprehensive means of determining auditory acuity. But there has always been the difficulty of standardizing so complex and so variable a thing as the spoken word. This difficulty is serious; for although speech has been somewhat widely employed for this purpose by physicians, otologists and school and army examiners, the want of a common unit of measurement makes it impossible to compare the results obtained. The results have, in consequence, only a local interest.

The first important step toward standardization—the careful compilation of standard test series, composed of a like number of representative phonetic elements—was taken by Mr. Andrews,* who likewise proposed, in the article cited, an improved method of procedure.†

The object of this note is to suggest a still further advance in the perfection of the speech test. Instead of employing directly the voice of the investigator, and instead of relying upon acoustic and organic conditions which vary from experimenter to experimenter and from place to place, it proposes to use permanent phonographic records, which can be copied an indefinite number of times and can be reproduced independently of local conditions. The phonograph is especially available at present, because recent improvements in construction provide hard, durable cylinders which are copies of a single master record. Thus it should be possible to reproduce in any place and under constant conditions the same test series, inscribed upon a single cylinder by a single voice.

Through the courtesy of the National Phonograph Company the writer has been permitted to make preliminary records at the company's works in Orange. These records have since been subjected to trial on an Edison phonograph in the Cornell laboratory.

In reproducing the series of test words it is necessary, of course, to control both pitch and intensity of the sound. Pitch is easily controlled by setting the phonograph at the rate used in inscribing the record (*e. g.*, 100 revolutions a minute of the cylinder). Intensity is controlled in two ways: (1) constancy of intensity is obtained by the use of the new 'model C' reproducer (Edison), whose writing point is held in the wax groove by a constant pressure automatically provided; (2) reduction of intensity is obtained by a device set into the rubber transmission-tube. The reducing device consists of two telescoping brass cylinders 15 cm. long. The outer cylinder is 1 cm. in diameter and is perforated with 35 holes of 4 mm. diameter, running from end to end in a spiral pattern. The inner cylinder has closed walls. When the two are pushed in together they form, therefore, a closed section of the transmission-tube; but as they are drawn gradually apart more and more of the 35 holes are uncovered, allowing a greater and greater escape of the sound. When all the holes have been exposed only a small fraction of the sound reaches the ear; when all the holes are again covered the tube is completely closed. Intermediate settings of the reducer (made by scale readings on the inner brass cylinder) give a wider range of intensities. To increase the range still further, stops are inserted in the smaller cylinder. The writer used three of these stops; one entirely closed, one with a circular aperture of 0.5 mm., and one with an aperture of 3.0 mm. diameter. The tests thus far made indicate that only two of the stops will be required. To avoid direct transmission of the sound, through the air, it is necessary either to place the phonograph in a partially sound-proof box or to conduct the transmission-tube through a wall or the key hole of a tightly-fitting door to a second adjoining room. It is only necessary that no sound be heard by the subject when the ear tubes are inserted in the ears but disconnected from the instrument. Several individuals can be examined at once by duplicating the ear tubes or by substituting a megaphonic horn for the

* *L. c.*, pp. 29–36 (final table of test words on page 36).

† *L. c.*, pp. 53 ff.

tubes. Both of these devices involve, however, some sacrifice of accuracy to rapidity. Whisper as well as conversation records have been used in our trial series. But the conversation records promise to give a more delicate measure of hearing than the others, and may eventually supplant the whisper series, which have, after all, been employed heretofore chiefly because they demand less floor space than the more intensive sounds of vocal speech.

It is worth noting that the number-words of the test disappear, as their intensities are gradually diminished by the setting of the reducer, as quite clear and well-defined sounds and not as blurred masses—an important point in an examination of this kind. The tests thus far carried out have been made with original—not molded—records. Should a sufficient demand arise, however, permanent master records could be provided.

A possible objection to the method proposed is that the control of the stimulus words, as regards both their quality and their intensity, falls short of the ideals of pure psychophysical work; but, in anticipation of this objection, it may be said that anthropometrical tests of capacity demand an entirely different standard of accuracy from psychophysical researches proper. The method suggested offers such evident advantages—in simplicity as well as in accuracy—over traditional methods, that it has seemed worth while to bring it to general notice.

I. M. BENTLEY.

QUOTATIONS.

THE ATLANTIC CITY SESSION OF THE AMERICAN MEDICAL ASSOCIATION.

THE fifty-fifth annual session of the American Medical Association, held last week, was the most successful of any held in the history of the Association, not only in the number in attendance, but in the scientific work accomplished.

The attendance excelled that expected by the most hopeful. With the exception of one of the international medical congresses, it was probably the largest gathering of medical men ever held anywhere, the registration numbering 2,890. At the meeting in Atlantic City in 1900, 2,019 registered; at St. Paul in 1901, 1,806; at Saratoga Springs in 1902, 1,425; and at New Orleans in 1903, 2,006. Yet in spite of the number in attendance there was no evidence of crowding and no criticism in regard to accommodations. Atlantic City certainly proved herself capable of entertaining in a most satisfactory manner. The local committees of arrangement had done their work well, and are to be congratulated on the arrangements made and on the successful outcome of this magnificent meeting.

From a scientific point of view, no meeting ever surpassed it, whether we consider the meetings of special societies, international congresses, or what not. Every year some sections report having done very superior scientific work. This year from all the sections comes this report. It is not only the section officers and those especially interested in the sections who are saying this, but those who have never before taken an interest in the sections and who are more directly interested in other societies than in the sections of the American Medical Association are also acknowledging the superior scientific work at Atlantic City. The section officers deserve great credit for this result of their year's efforts. The officers of each section have vied with each other in trying to outdo what has been done in the past and to produce a program that should be superior scientifically to that of any preceding year and to that of any other special society. Those who know the amount of labor necessary to get up such a program and to make a section successful will appreciate that all the section officers have worked hard and have done their duty faithfully. They have all set standards for their successors that will be hard to surpass.

The symposia following the orations on Tuesday, Wednesday and Thursday evenings were something entirely new with this session, and they proved to be valuable as well as attractive. Never before have the general meetings been so well attended. The symposium on the first evening, which was devoted to a description of the research work that is being done in several institutions in this country,